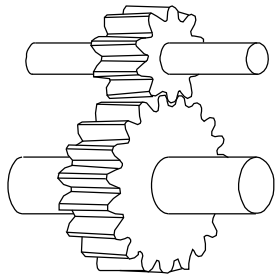
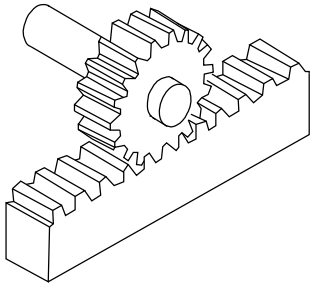
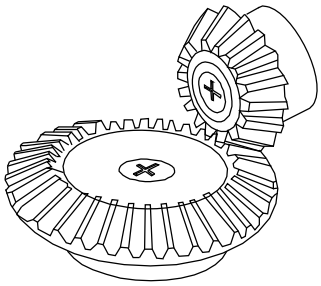
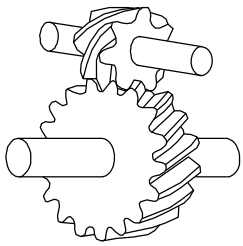
Fixing gear wheel for various purpose drives

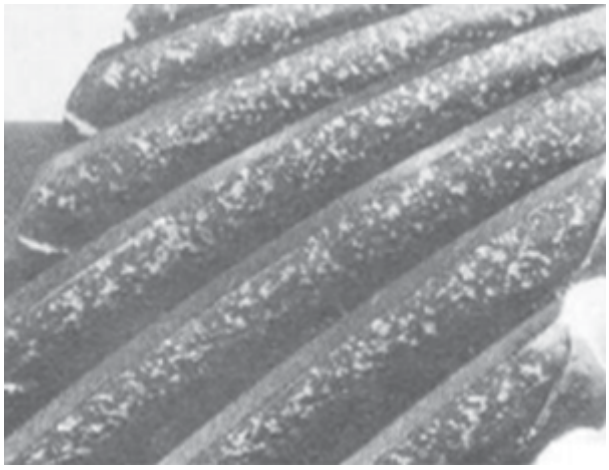
Objectives : At the end of this lesson you shall be able to
- **name the different methods of gear fixing for different drives**
- **list the use of each type gear**
- **state the cause and remedies of gear tooth wear**
- **state the methods of fitting different type gears**

	**Parallel axes** Transmit power and motion between parallel shafts. Spur gears and helical gears are used. Example: Lathe gear box
	Change the rotary motion into the rectilinear motion and vice versa. A combination of spur gear and rack or a combination of helical gear and helical rack is needed to do work. Example: Dial test indicator
	**Intersersecting axes** Transmit power and motion between intersecting shafts at right (90°) angles. Straight bevel gears or spiral bevel gears are used. Example: Shaping machine table
	**Non parallel, non intersecting axes** Transmit motion and power between nonparallel, nonintersecting shafts that are usually at right angles (90°). Screw gears and worm gear pair are used. Example: Dividing head

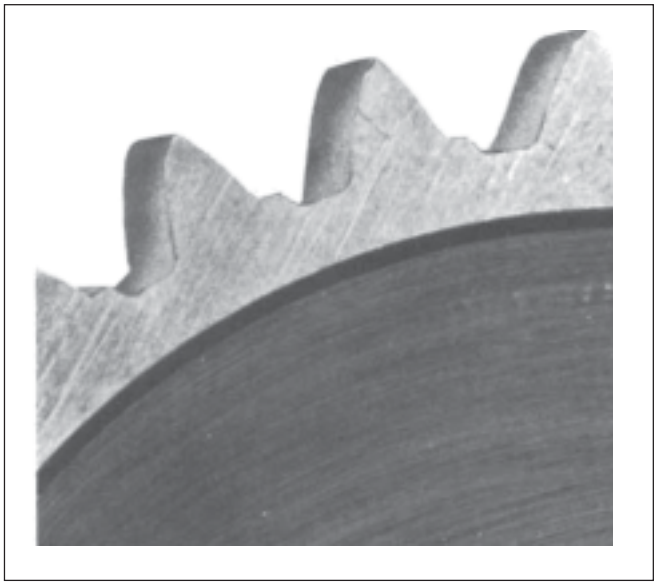
Wear and tear of toothed wheel and their remedies

Wear: A surface phenomenon in which layers of material is removed or "worn away"

Moderate wear



Exessive wear



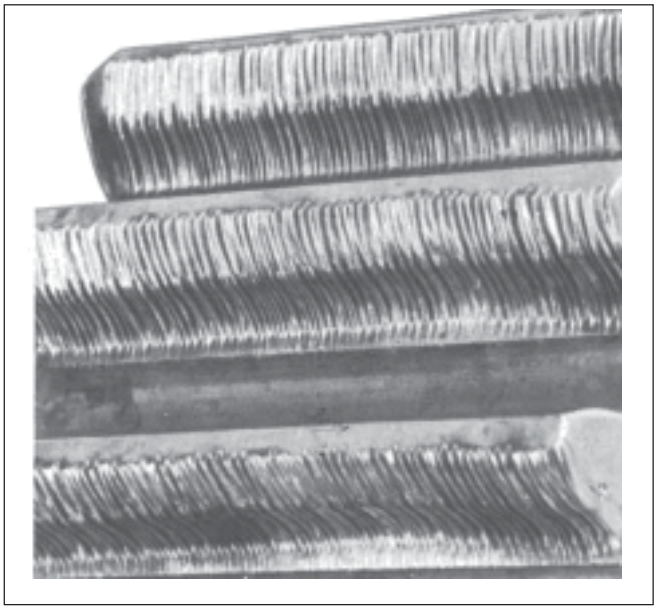
Cause: Wear in progress,in a dequate lubricant film

Remedies: Increasing lubricating film strength, sufficient oil is supplied to working surfaces.

Abrasive wear

Cause: foreign material in the lubrication metallic debris. from the gear.

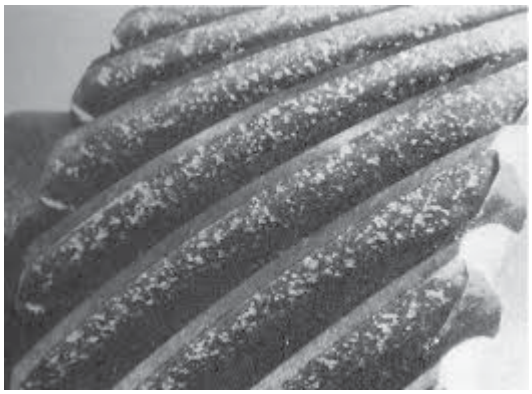
Corrosive wear



Cause: Corrosive elements in oil

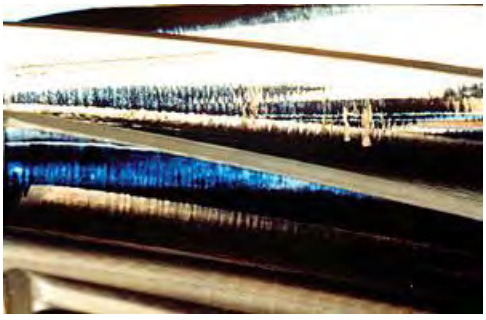
Remedies: Use of filter and use high thick lubricating oil.

Crushing



Causes: Surface irregularities,misalignment of gears.

Remedies: Smooth gear surfaces, reduce dynamic loading limit, keeping the load below the endurance limit.

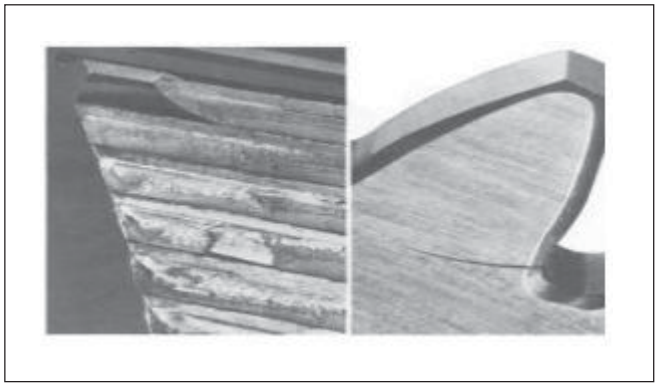


Fracture: Fracture is caused by breakage of whole tooth

Fatigue breakage

Cause: Extreme tooth loads, notches

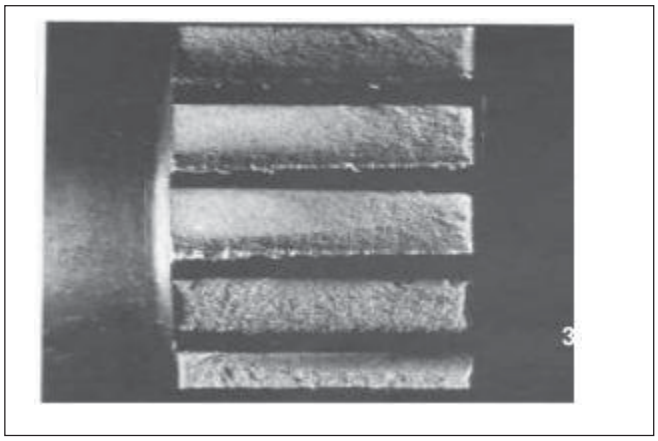
Remedy: Higher strength material,load in with endurance limit



Overload

Cause: Overload which exceeds tensile strength

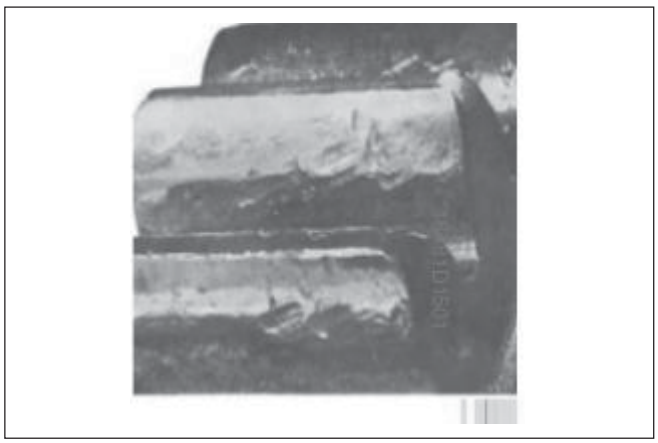
Remedy: Torque limiting overload protectiondevices



Plastic flow: Cold working of tooth surfaces caused by high contact stress.

Cold flow

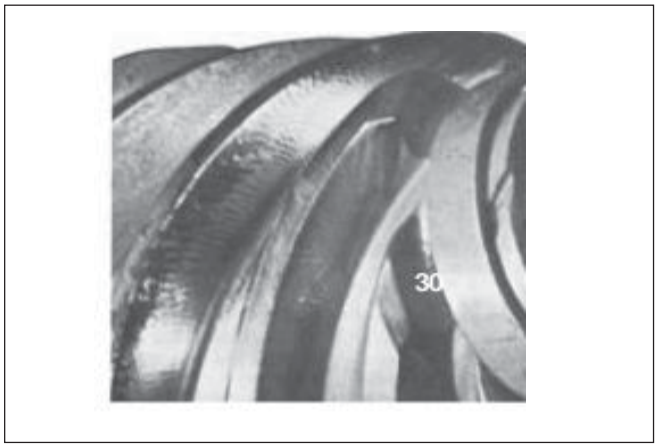
Causes: Rolling and peening action of much under heavy loads.



Rippling

Cause: Cyclic loads under high contact stresses.

Remedy: Case hardening of tooth surface.



Method of fitting spiral gear, helical gear, bevel gear and worm gear

Worm and worm wheel

The mounting of worm gears is critical to their implementation. Multiple points of contact are necessary between the drive and gear, so high work loads do not overwork the same lead angle, which could lead to gear failure. Enveloped worm gear sets are normally assembled in the same housing, to ensure proper mating and due to the sets' small footprint.

Consider the gear center, bore diameter and shaft diameter. The gear center can be a bored hole or an integral shaft. The bore diameter is the diameter of the center hole. The shaft diameter is the diameter of the shaft for gears with an integral shaft. Worms and worm gears can be mounted on a hub or shaft. A hub is a cylindrical projection on one or both sides of a worm or worm gear, often for the provision of a screw or other shaft attachment mechanism.Hubless gears are typically attached via press fit, adhesive or internal keyway.

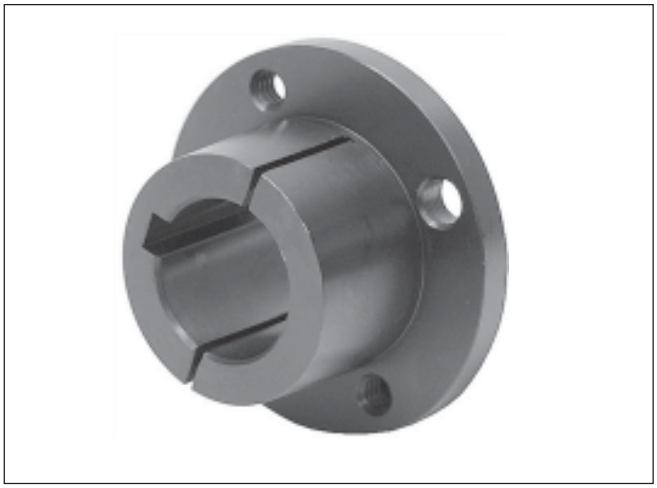
Shaft mounting choices include the following:

Keyway: One or more square cutouts exist in the gear bore for exact mounting on the shaft.

Set screw: The gear is attached to the shaft by screws through the hub.

Simple bore: A straight bore designed for adhesive attachment.

Split: The hub is split into several pieces that are tightened down by a separate clamp to grip the shaft.



Helical gear

Consider the gear center, bore diameter and shaft diameter.The gear center can be a bored hole or an integral shaft. The bore diameter is the diameter of the center hole. The shaft diameter is the diameter of the shaft for gears with an integral shaft. Helical gears can be mounted on a hub or shaft. A hub is a cylindrical projection on one or both sides of a helical gear, often for the provision of a screw or other shaft attachment mechanism. Hubless gears are typically attached via press fit, adhesive or internal keyway.

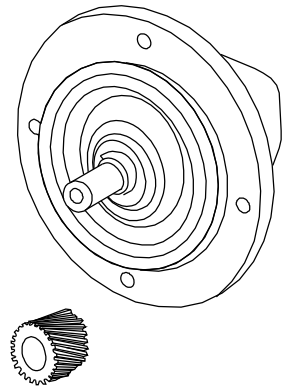
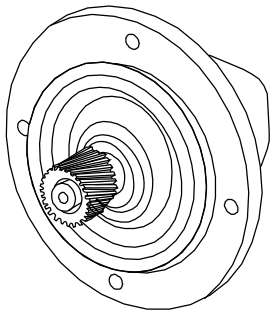
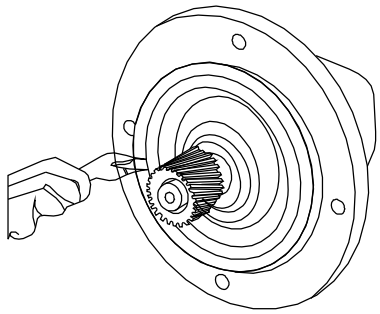
Illustration	Procedure
	• Prepare the input side. • **Important:** The round chamfer on the bore of the pinion must lie in the direction of the shaft shouder.
	Mount the pinion onto the shaft.

Illustration	Procedure
	Fit the retaining ring using the pliers.

Bevel gear

Bevel gears are **gears** where the axes of the two shafts intersect and the tooth-bearing faces of the **gears** themselves are conically shaped. **Bevel gears** are most often **mounted** on shafts that are 90 degrees apart, but can be designed to work at other angles as well.

Several parameters contribute to proper assembly to operate the gear box smoothly and efficiently.The most important are

- Back lash Fig 1
- Mounting distance Fig 2

Fig 1

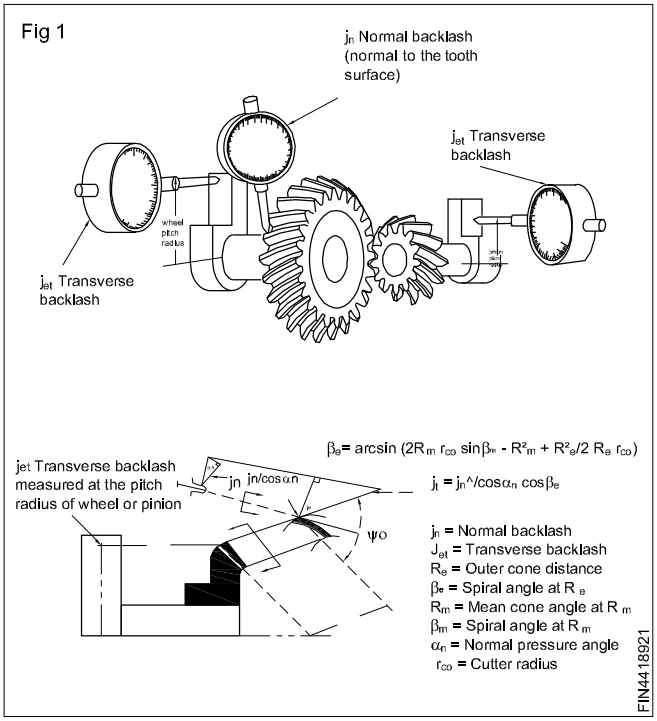


Fig 2